Appendix G

Field Evaluations of Power System Transducers

This appendix relates to Chapter 6, §6.4.

Several field measurements on transducers at BPA substations have been made [6-15,6-19]. Figure G-1 shows typical instrumentation [6-20].

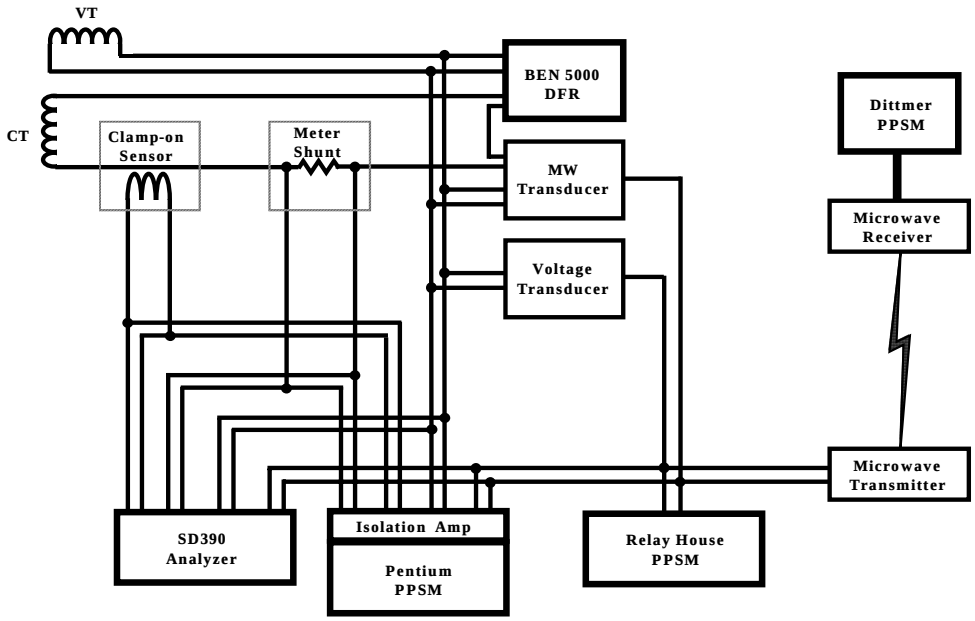

Fig. G-1. Instrumentation for transducer measurements at Slatt substation, 04/24/96 (showing one phase only for transducer inputs).

Spectra characterizing the signal environment are shown in Chapter 6, §6.2.

Figures G-3 through G-5 present signal output spectra from an analog watt transducer at Slatt substation, for progressively broader processing bandwidths. These show a great deal of fine structure. Much seems associated with harmonics of the 60 Hz power frequency, or at frequencies above the normal range for known system dynamics. (Figure G-2 is an exception.) It's likely that most of the peaks represent processing artifacts. If so, they contain information about the inner workings of the transducer (hence its quality) and they are useful benchmarks for laboratory or simulation studies.

Figures G-6 and G-7 shift the focus back to the transducer inputs. They confirm that the recorded voltage inputs, obtained with temporarily installed instruments, are consistent with those recorded there on the permanently installed BEN 5000 digital fault recorder. They also confirm that scaling requirements for DFR current recording will generally preclude use of such data for small-signal analysis.

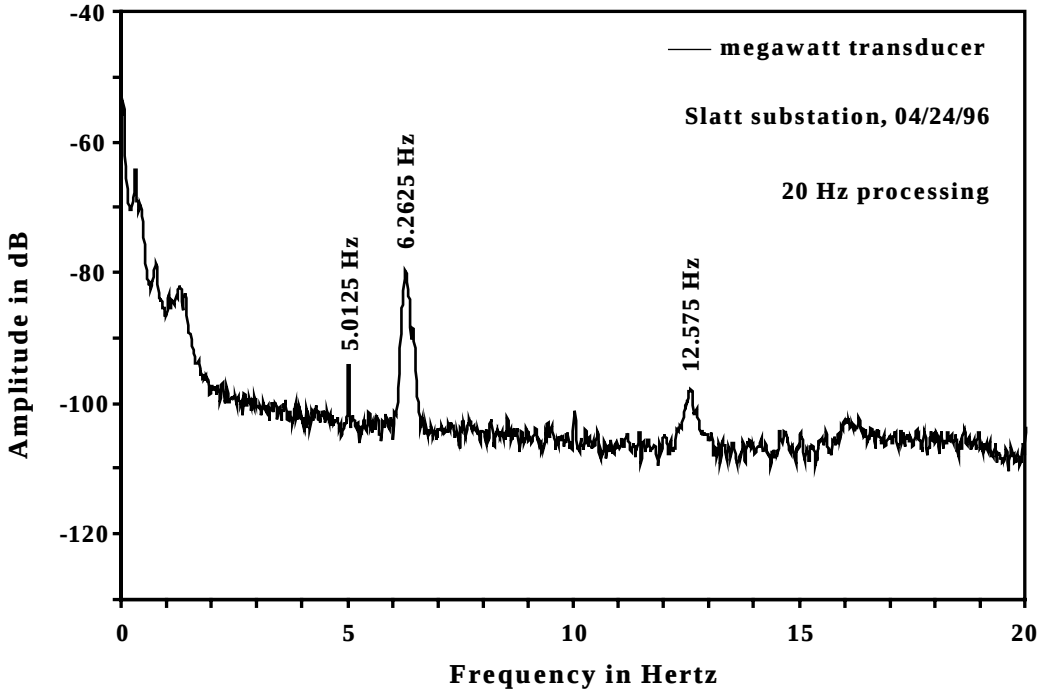

Fig. G-2. Autospectrum for watt transducer (20 Hz processing).

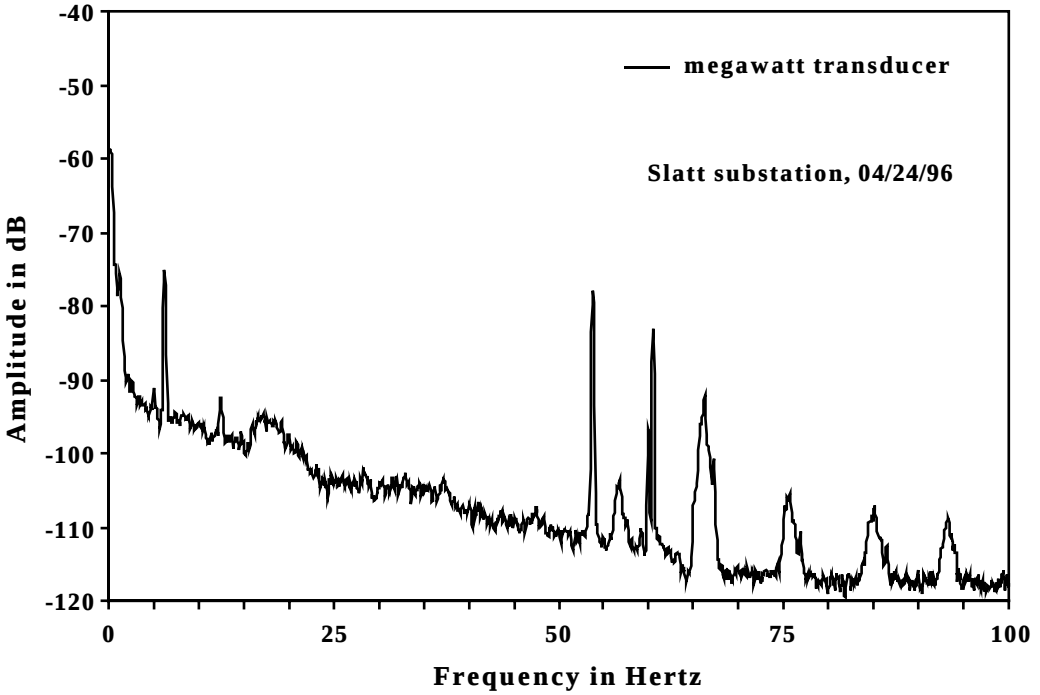

Fig. G-3. Autospectrum for watt transducer (100 Hz processing).

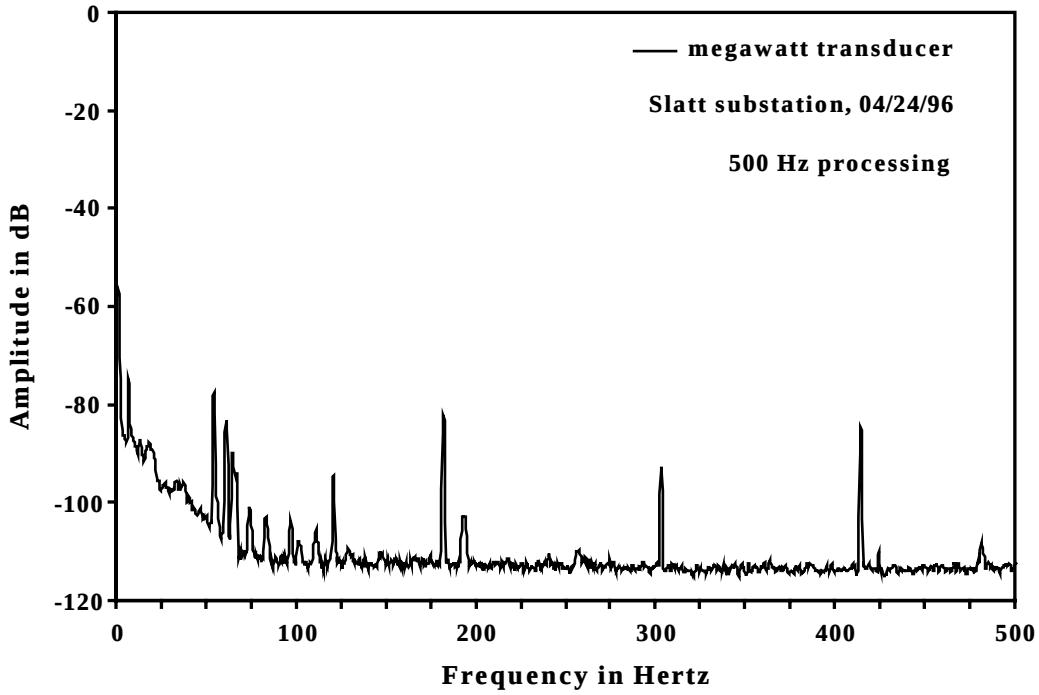

Fig. G-4. Autospectrum for watt transducer (500 Hz processing).

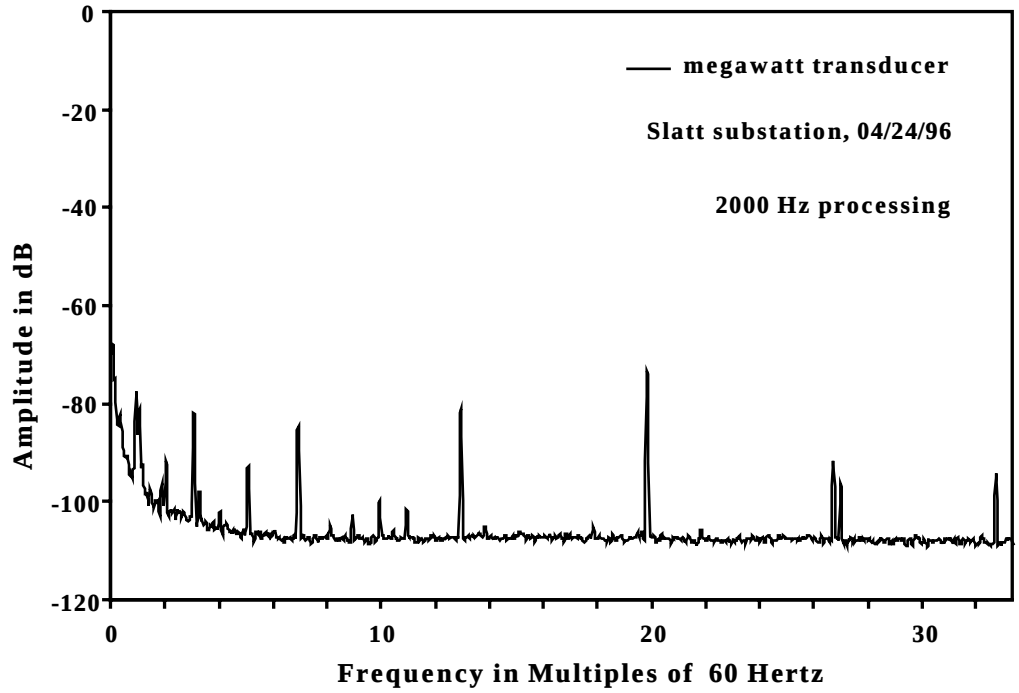

Fig. G-5. Autospectrum for watt transducer (2000 Hz processing).

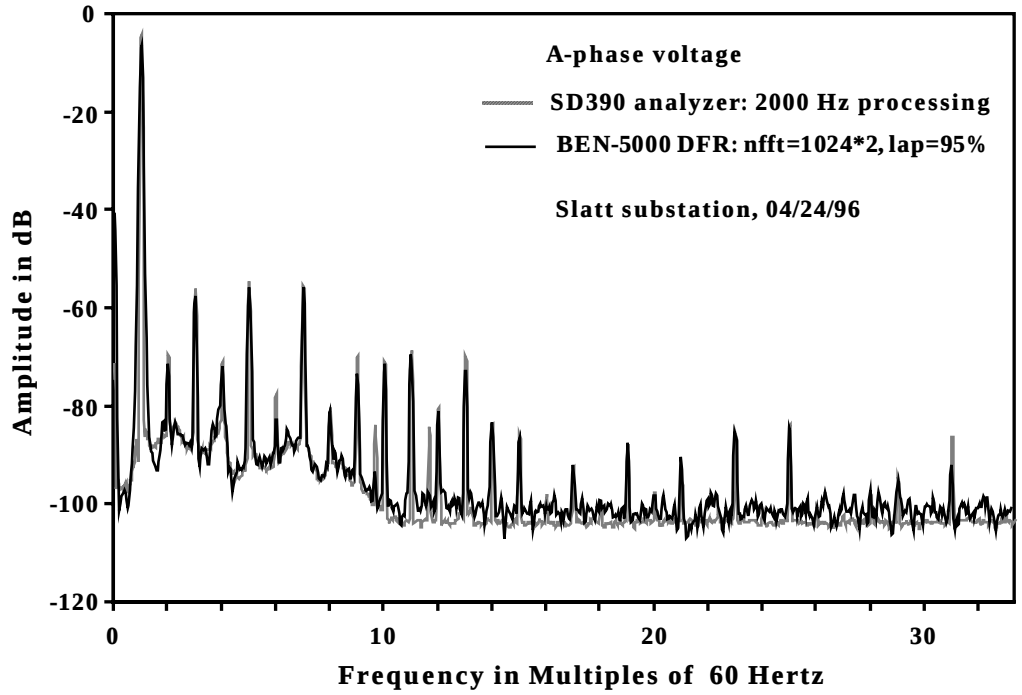

Fig. G-6. Comparison against MATLAB processing of DFR voltage data.

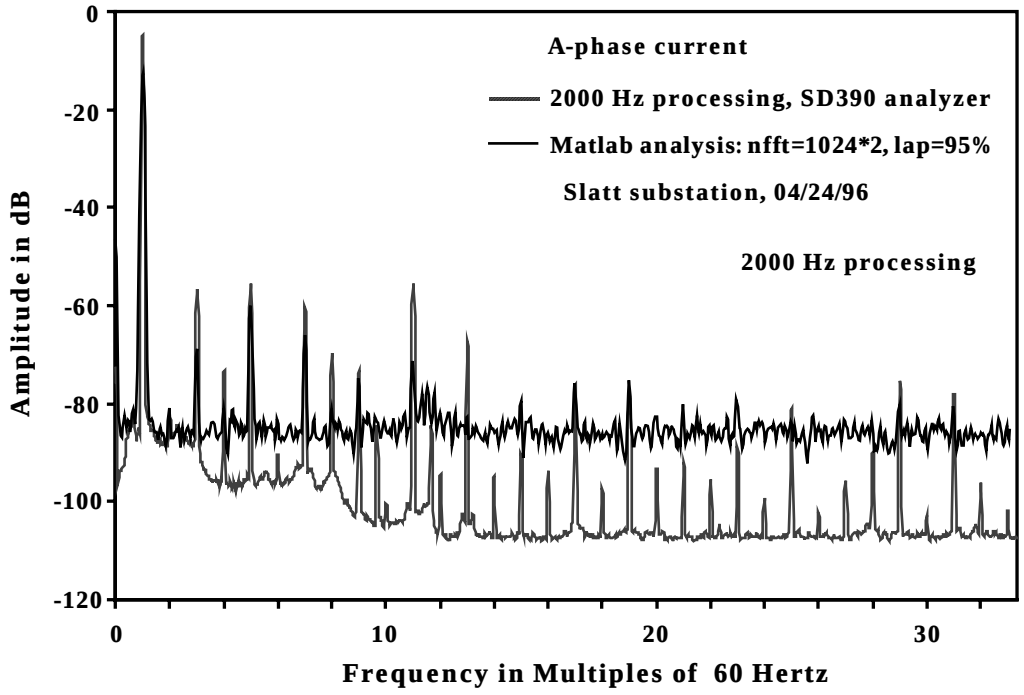

Fig. G-7. Comparison against Matlab processing of DFR current data.